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Keywords: Preindustrial Spain, Frontier economy, Reconquest, Black Death, Rise, Decline, Western Europe

JEL Classification: E01, N13, O47

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The Rise and Fall of Spain (1270-1850)

When and why did Spain fall behind continues being debated since Earl Hamilton's (1938) seminal contribution and attempts have been made at quantifying Spain's relative position over time (Yun-Casalilla 1994, Carreras 2003, van Zanden 2005a, 2005b, Maddison 2006). It has been recently suggested that Spain had attained affluence prior to her American expansion that increased throughout the 16th century so by 1590 she was among the top countries in Europe in per capita income terms (Álvarez-Nogal and Prados de la Escosura 2007). This finding raises the crucial question of when, and why, did Spain achieve such an early prosperity.

This paper provides a tentative answer by examining Spain's comparative performance over the half-a-millennium between the end of the *Reconquest* (1264) and the beginning of modern economic growth by mid-19th century. We proceed, firstly, by estimating trends in output. Specifically, movements in agricultural output are drawn using an indirect demand approach (Section II), while those in industry and services are proxied through changes in urban population not living on agriculture (section III). Thus, trends in per capita output over 1280-1850 are obtained (section IV).² A re-examination of Spain's relative position within Western Europe closes the paper.

From our quantitative exercise we conclude that two distinctive regimes appear to exist in preindustrial Spain. A first one (1270s-1590s) corresponds to a high land-labour ratio frontier economy, largely pastoral, trade-oriented, and led by towns. Wage and food consumption levels were relatively high. Sustained per capita growth took place from the 1270s, after the *de facto* end of the *Reconquest* (Figure 1), until the 1340s, when the Black Death (1348) and the Spanish phase of the Hundred Years War (1365-89) interrupted it.³ Growth resumed, then, only broken by late-15th century political turmoil. A second regime (1600s-1810s) corresponds to a more agricultural and densely populated, low wage economy with growth occurring along a lower path.

² In addition to a longer time coverage, the national and continuous series approach represents a major difference with Álvarez-Nogal and Prados de la Escosura (2007) regional output estimates at benchmark years over 1530-1850, from which national output figures were obtained through aggregation. Lack of data precludes so far a regional approach for the wider time span considered here.

³ The *Reconquest* ended definitively with the fall of the Nasrid kingdom of Granada in 1492 but Christian-Muslim boundaries remain stable since 1264.

Thus, Spanish relative affluence by 1492 can be tracked down to the pre-Black Death era. Contrary to most of Western Europe and the Eastern Mediterranean, where the highest standards of living of the pre-industrial era were achieved after recovering from the plague by the mid-15th century, in Spain, the peak level of output per head was reached in the 1340s. In pre-Plague Spain, Malthusian forces were mostly absent except, if any, for few areas along the Mediterranean coast. Sustained progress took place after the *Reconquest* in the context of a frontier economy, urban expansion, and openness to trade. Although its population toll was lower, the plague had a much more damaging impact in Spain than in Western Europe since, far from releasing non-existent demographic pressure on land, it destroyed the equilibrium between scarce population and abundant resources. Pre-Black Death per capita income levels were temporarily recovered by the late 16th century and only overcome after 1820.

Thus, the fall in output per head in the late 14th century and, again, in the early 17th century represent two major steps in Spain's (absolute and relative) decline. Later, in the early 19th century, although demographic expansion was paralleled by an increase in GDP per head, paradoxically the relative decline of Spain deepened.

Output in agriculture: an indirect approach

Agricultural output for Spain as a whole has been estimated indirectly. Given the lack of hard empirical evidence for medieval and early modern Europe, alternative ways of deriving output trends have been put forward.⁴ Wrigley's (1985) proposal assumes that, in the long run, food consumption per head is roughly constant. This way output in agriculture evolves as total population adjusted for the agricultural trade balance.⁵ The rationale for Wrigley's approach is that in a traditional economy workers try to keep their food consumption per head stable (Lewis 1955). Recent research on developing countries reveals that consumption per head of food staples remains constant in aggregate terms even as per capita income rises (Bouis 1994). In the absence of empirical evidence Wrigley's approach provides useful explicit quantitative conjectures. Wrigley's hasty procedure has, nonetheless, some shortcomings. For

⁴ An alternative indirect estimate on the basis of tithes is currently under construction.

⁵ Such method has been used for late nineteenth and early twentieth century Japan (Nakamura 1965), eighteenth century Britain (Deane and Cole 1967, Overton 1996), nineteenth century Spain (Simpson 1989, 1995) and, more recently, medieval Italy (Federico and Malanima 2004).

example, the assumption of constant per capita food consumption can be criticised on the grounds that the values of price and income elasticities of demand for food in developing countries are significantly different from zero (Kaneda 1968, Crafts 1976).

An alternative to estimating agricultural output indirectly is provided by the demand function approach.⁶ A recent user of this procedure, Allen (2000), derived agricultural output for a sample of pre-industrial European countries. He firstly estimated agricultural consumption per head that, adjusted for net food imports, allowed him to derive output per head and, then, with population, obtained absolute output. In the demand approach, real consumption per head of agricultural goods (C) can be expressed as,

$$C = \alpha P^\varepsilon Y^\mu M^\gamma \quad [1]$$

in which P and M respectively denote agricultural, and non-agricultural prices relative to the consumer price index (CPI), Y stands for real disposable income per head; ε , μ , and γ are the values of own price, income and cross price elasticities, respectively; and α represents a constant.⁷ Taking rates of variation (denoted as low case), we get:

$$c = \varepsilon p + \mu y + \gamma m \quad [2]$$

Since information on income per head (Y) for preindustrial Europe is usually lacking, Allen's suggestion of real wage earnings (W) per worker as a second best alternative provides a most convenient solution. The rationale for Allen's (1999: 214) claim is that as proprietors comprise a small share of population and only consume, therefore, a small fraction of total food, workers' returns provide a relevant measure of disposable income. Hence, changes in real wage earnings (w) are suggested to proxy changes in real income per head (y) in equation [2]. However, the extent to which changes in real wages are representative of changes in workers' real earnings remains an unsettled issue. It is commonly accepted that wages were only a part of household incomes, especially in rural areas (García Sanz 1981) but the degree to which variations

⁶ Crafts (1976, 1980, 1985) was the pioneer in the use of the demand approach to derive agricultural consumption and output. The method was later used by for eighteenth century Britain (Jackson 1985, Allen 1999) and nineteenth century Spain (Prados de la Escosura 1988, 1989) and has been recently employed by Álvarez-Nogal and Prados de la Escosura (2007), Pfister (2011) and Malanima (2011).

⁷ Allen (2000) arbitrarily assigned the value of 1 to α . It is worth noting that Wrigley's proposal represents a particular case of a demand function for agricultural goods in which price and income elasticities are zero.

in household income are captured by those in real wage earnings is an unknown.⁸ Nonetheless, identifying labour compensation with disposable income ignores ‘the contribution of property-income growth to the overall rise of national income’ (Hoffman et al. 2002) and implies the improbable assumption that the share of labour in national income remains stable over time.⁹

To complicate the situation further the available evidence on wages in early modern Europe usually refers to wage rates (w) while what is actually needed is real wage earnings (W), that is, wage rates (w) times the number of days or hours (h) worked per person-year.¹⁰ Changes in work intensity affect yearly wage earnings per economically active person. In the early modern age, workers (and their families) were prepared to increase their work load either because of the higher opportunity cost of leisure resulting from wider consumption choices (de Vries 1994, Voth 1998, Allen 2004), or to offset the decline in wages rates (van Zanden 1999, Malanima 2007). In fact, a more intense use of land appears to go along declining wage rates, implying a more intense use of labour (Boserup 1987, Malanima 2007, De Vries 2008). The corollary is that long-run changes in real wage rates do not necessarily capture those in real returns to wage labour.¹¹

Given the dearth of direct estimates with contemporary data, the choice of values for price and income elasticities to be used in the calibration of the demand for agricultural goods presents another challenge. Studies on developing countries, not too dissimilar in income per head from most countries in the early modern Europe (Maddison 2006), cast values of 0.7/0.8 for the expenditure elasticity for food (and

⁸ The fact that, in times of hardship, authorities usually tried to regulate and control nominal wages suggests that the representativeness of wage labour is higher than commonly accepted (Bois 2000, Sanz Fuentes 1987, Vaca 2001).

⁹ Moreover, if real wages are used as a proxy for real per capita GDP, deflators matter too. In the case of nominal wages, a consumer price index is usually employed to obtain real wages, while to derive real aggregate output the GDP implicit deflator, which reflects the prices of both consumption and investment goods, is used. As these two price indices do not necessarily evolve alike, another potential bias may be introduced in agricultural output estimates derived with real wages as a proxy for real disposable income per head.

¹⁰ This procedure implies that using expression (2) with the variation in wage rates as a proxy for those in real disposable income per head provides a measure of changes in daily or weekly per capita consumption, so the challenge is to ascertain the extent to which working time, and, hence, yearly consumption per head varies in the long run.

¹¹ The improvement of housing, the acquisition of durable goods and the increasing consumption of exotic goods has been pointed as evidence of material progress just at the time real wage rates were declining (Reis 2005: 199).

own price elasticity values of -0.5/-0.6) (Lluch et al. 1977).¹² However, it has been claimed that cross-section estimates of income elasticity tend to be upwards biased as food transfers from high to low income groups are inaccurately recorded in food expenditure surveys (Bouis 1994). A similar conclusion is reached for Britain during the Industrial Revolution by Clark, Huberman and Lindert (1995) who argue that budget studies fail to include high income consumers who, by Engel' law, have lower income elasticities of food demand.

A relevant caveat is that, as an economy grows, the value added of food relative to its inputs (agricultural staple goods) increases by including services rising, in turn, the income elasticity of demand for food.¹³ Thus, adopting income elasticities of food demand for present-day developing countries in order to calibrate the demand of agricultural staples in the past may over-exaggerate the true value of their income elasticities.¹⁴ Interestingly, Kaneda (1968) found income elasticity values of 0.3/0.4 for agricultural products in Japan over 1878-1940, certainly low but not implausible values for developing countries.¹⁵ Time series estimates of income elasticity of demand for Spain over 1850-1913 cast significantly different values for food (0.9) and for agricultural goods (0.4) and tend to confirm our hypothesis. If, in turn, real wage rates rather than per capita GDP are used, the income elasticity for agricultural goods falls to 0.3.¹⁶

For pre-1800 Europe Allen (2000) cautiously assumed values of 0.5 and -0.6 for income and own price elasticities and used the Slutsky-Schultz relation to derive the cross price elasticity of demand, while Federico and Malanima (2004) adopted values

¹² Moreover, direct cross-section estimates for late 1950s Spain still show high absolute values for income (and own price) elasticity of food demand (0.9, and -0.7, respectively) (Lluch 1969).

¹³ The income elasticity of demand for these services is higher than that for staple food products. Clark et al (1995: 234-235) point out, "the value of food and beverage consumption rises relatively to the foodstuff supplies over the course of development", while Kaneda (1968) uses a similar argument to the one employed here to explaining why income elasticity of food demand was higher in the 1950s than in the previous decades.

¹⁴ This does not necessarily mean that the services content of food in early modern Europe was lower than in today's developing countries. Probably the difference, then and now, lies between countryside and town, with lower services content of food in rural areas.

¹⁵ Cross-section estimates of income elasticities for aggregate food staples from household surveys are often in the 0.3/0.6 range (Bouis 1994).

¹⁶ Estimates computed from data in Prados de la Escosura (2003).

of 0.4 and -0.5, respectively, for early modern Italy.¹⁷ Our preference for low absolute values of income ($\mu = 0.3$) and own price ($\epsilon = -0.4$) elasticities in the Spanish case is motivated by the fact that we are addressing the demand for agricultural staple goods, not for food itself that incorporates higher income-elastic services. Moreover, low values of income elasticity somehow capture the impact on the demand for food staples resulting from variations in working time as a response to changes in real wage rates. In other words, we are explicitly assuming that the *daily* wage elasticity of demand for foodstuffs is lower than the income elasticity of the demand for food.

Let's look now at the evidence available for our case. Real wage rates experienced a rise between the late 13th and mid-14th century, followed by a sharp decline until the end of this century and, then, a recovery in the early 15th century, when the highest real wage rates of half a millennium were reached. A long-term decline took place from mid-15th to mid-17th century followed up by a flat long-run trend to the early 19th century. However, it was not until mid-16th century when real wage rates fell below pre-Plague levels (Figure 2).

Yet it is unclear that wage rates capture trends in wage earnings, as incentives to work harder increased over time. In the 18th century, for example, as population grew and trade expanded, relative prices changed, and a more intense use of land took place with a shift from extensive livestock rearing (sheep) to crops (cereals, vineyards, olives) and also to cash crops (fruit trees, etc) along the Mediterranean coast (Anes 1970).¹⁸ Rising demand from an expanding population contributed to the increase in food prices that led, in turn, to a sustained fall in real wage rates as nominal wages were much more stable. Given the low number of days worked per economically active population, particularly in agriculture, the supply of labour was presumably rather elastic, and workers could make for the fall in daily real wages by increasing the amount of days allocated to work over the year. For example, in the Kingdom of Castile c. 1750 the Cadastre de Ensenada assigned 120 days of work per year to day-labourers (rural and non-rural), 180 to artisans, and 250 to servants (Ringrose 1983) which

¹⁷ The Slutsky-Schultz relation states that for the individual demand of any commodity, the income elasticity, with a negative sign, is the sum of own price and cross price elasticities, so it allows one to derive the value of the cross price elasticity of demand from the assumed values for own price and income elasticities.

¹⁸ In Catalonia, the increase in trade stimulated the use of marginal, unexploited lands for vineyards and olive trees as a growing demand covered the cost of opening up new lands (Vilar 1962).

weighted by each sector's share in economically active population (EAP) cast an average of 168 days per EAP/year.¹⁹ This figure is almost identical to the one derived by Malanima (2011) for Italy (165 days on average over 1700-1750) and significantly lower than those suggested by Allen (2001) for early modern Europe (250 days), or by Bairoch (1965, 1989) for the nineteenth century (196 days). Scattered evidence for the construction industry suggests an increase in the number of days worked from the 17th to the 18th century.²⁰

However, there is probably some asymmetry in the suggested inverse association between real wage rates and working time. For example, at times of high wages it seems unclear that an increase in real wage rates would lead to a reduction in days of work per active person. This would be a most plausible scenario for Middle Age Spain, a frontier economy with presumably a low number of working days per EAP.

The early nineteenth century provides a new scenario in which real wage rates went along an intensification of work as a result of wider access to property, following liberal reforms, in particular, the *desamortización* –the disentailment of church and communal lands-, and the increase in the variety of goods and services provided by the market. Thus, by 1850, economically active population [EAP] in agriculture worked an average of 240 days per year.²¹ During the first half of the nineteenth century EAP in agriculture multiplied by 1.5 (Álvarez-Nogal and Prados de la Escosura 2007) while according to Bringas (2000: 86), the area of cultivated land multiplied by 2.4. If we assume that labour effort per hectare (measured in days of work per EAP/year) remained constant over the same period, the number of working days in agriculture by 1800 would have been around 150 ($=240 \times 1.5 / 2.4$), a figure consistent with that of 120 working days per year at the time of the Cadastre of Ensenada (c. 1750), that is, prior

¹⁹ See also Vilar (1970: 129) and Santaolaya Heredero (1991). The low figure for days worked in agriculture is confirmed by Simpson (1992) for late nineteenth century Andalusia on the basis of labour input requirements.

²⁰ In Valladolid during the 17th century most workers were occupied less than 150 days (Gutiérrez Alonso 1989). In turn, Madrid masons only worked, on average, 3.5 days per week during winter while in summer they went up to 4.4 days/week during late 18th century (Nieto Sánchez 2006: 428). Assuming, on average, 4 days per week it represents 208 days per year. The latter figures match closely those provided for Italy by Malanima (2011) for 1750-1800, 200 days on average.

²¹ Such figure is a weighted average computed from data of labour force and days worked at provincial level in Spain c. 1850 (del Moral Ruiz 1979)

to the agricultural expansion of the late eighteenth century. However, the scant evidence available is far from conclusive.²²

Yet, before accepting changes in real wage earnings as a proxy for those in real disposable income per head, the stability of the share of labour in national income needs to be established. Inequality was deep in early modern Spain. For example, c. 1750, the wealthiest 10 percent outweighed the poorest 40 percent by 15 to 17 times in Old Castile.²³ These ratios are similar to those found for contemporary England (14 times), and France (17 times) (Hoffman et al. 2002).²⁴ Nonetheless, high inequality can be compatible with the stability of the labour share in national income. Was this the case of pre-industrial Spain? Trends in relative factor returns provide a good test for the stability of income distribution.²⁵ A measure of income inequality, the land rent/wage ratio, shows a flat long-run trend between the early 14th and 16th centuries and, then, rises from the 1530s to the 1590s and, again, between the 1730s and the 1800s, but declines in the 17th and the early 19th centuries (Figure 3).²⁶ Thus, it appears, in particular, for early modern Spain, that, unless returns to property are included in our proxy for disposable income, in phases of rising (declining) inequality our estimates may suffer a downward (upward) bias and, hence, provide a lower (upper) bound of the actual agricultural output.²⁷

We have calibrated, then, the demand of agricultural goods using equation [2]. The main challenge is posed by the choice of a proxy for changes in real disposable

²² Thus, conjectures about cultivated land by Garrabou and Sanz (1985) suggest that it only increased by 20 percent between 1800 and 1860 which would imply that hectares per agricultural EAP fell during the early 19th century. Moreover, the low number of days worked per labourer in late 19th century Andalusia (Simpson 1992) hardly suggests any work intensification per EAP.

²³ Computed from Yun-Casalilla (1987).

²⁴ Gini coefficients for income distribution at different Old Castile towns c. 1750 cast values ranging from 0.39 to 0.56, while similar estimates were obtained for Jerez (around 0.5) (Álvarez-Nogal and Prados de la Escosura 2007). These figures are close to the 0.52 Lindert computed for England and Wales in 1759 (<http://www.econ.ucdavis.edu/faculty/fzlinder/Massie1759rev.htm>).

²⁵ As Hoffman, Jacks, Levin, and Lindert (2002: 325) point, real inequality was 'caused by the interaction of population growth with concentrated land ownership and the Engel's law'.

²⁶ Scattered evidence indicates that the incomes of the middle and upper classes were growing in early modern Spain, while those of the lower classes were stagnant or declining (Nader 1977).

²⁷ As a test, we have estimated per capita consumption of food for Spain over 1850-1913 with a demand function (and a common data set from Prados de la Escosura (2003)) using real wage rates (Bringas 2000) and GDP per head, alternatively, as indicators of real per capita disposable income. The results confirm the downward bias introduced when wage rates are employed as a proxy for income per head. Interestingly, when agricultural consumption per head for eighteenth century England is derived with a demand function, the use of per capita income (Crafts 1985) also shows a faster pace of growth than when real wages rates are employed (Jackson 1985, Allen 1999).

income per head. One option, following Allen (2000), is to use the variations in real wage rates (Estimate I).²⁸ A second option is to assume that workers reacted to declining real wage rates by working extra days, so real returns to labour remained stable over time. This assumption, that seems plausible for 18th century Spain, does imply that changes in the consumption per head of agricultural staples would only depend on the relative price of agricultural and non-agricultural goods weighted by their own- and cross-price elasticities (Estimate II).

A third option results from a more comprehensive proxy for disposable income per head in which, in addition to a crude measure of labour earnings, the returns accruing to proprietors are also taken into account. We have been able to construct a crude proxy of real disposable income as a weighted average of real wage rates and real land rents, in which the shares of labour (0.75) and property (0.25) in Spain's national income during the 1850s are used as weights (Prados de la Escosura and Rosés 2009) (Estimate III).²⁹ Nonetheless, this alternative estimate suffers from the same weakness of Estimate I, since we do not allow for changes over time in the number of days worked per EAP and in the amount of land exploited.

As regards the values of demand elasticities, we have explored alternative sets, ranging from -0.7/-0.4 (own-price elasticity, ϵ) and 0.6/0.3 (income elasticity, μ) with cross-price elasticity (γ) always equal to 0.1, but finally opted deliberately for low absolute values: $\epsilon = -0.4$; $\mu = 0.3$; $\gamma = 0.1$.³⁰ As discussed above, the adoption of lower values for income and own price elasticities for preindustrial Spain than those computed for countries at similar levels of development allows for the fact that we are addressing the demand for agricultural staple goods. Furthermore, by choosing a low value for income (wage) elasticity we allow for the fact that the demand for

²⁸ It is worth noting that the use of unskilled wages does not alter significantly our results since most workers were unskilled.

²⁹ Lack of long run series for interest rates precluded its inclusion in our proxy for disposable income.

³⁰ Allen (2000) and Malanima (2011) used similar values for own price ($\epsilon = -0.6$ and -0.5), income ($\mu = 0.5$ and 0.4) and cross price ($\gamma = 0.1$) elasticities of demand. It is worth mentioning that elasticities should be adjusted over time as income per head changes. However, since presumably per capita income in preindustrial Spain was low and varied within narrow limits the range within which expenditure and own price elasticities would fluctuate is rather narrow, and so is the range for the output estimates obtained using alternative elasticities.

agricultural food staples was affected by changes in number of days worked per EAP/year in a response to real wage rates variations.³¹

In Figure 4 and Table 1 the three alternative estimates of agricultural consumption per head are provided and implicitly compared to Wrigley's assumption of a constant consumption per head of agricultural goods (a constant value of 4.6 expressed in natural logs). It clearly appears that Wrigley's approach proves inadequate since, even when real disposable income is assumed to remain unaltered (Estimate II), the demand for agricultural staple goods reacts to changes in relative prices and, hence, consumption per head is far from stable. In fact, the decline in real per capita consumption observed for the demand estimate which includes real wage rate as a proxy for disposable income (Estimate I) is confirmed, but for a milder slope, in Estimate II. Another interesting finding is that the inclusion of land rent as a proxy for returns to property in our measure of disposable income (Estimate III) confirms the declining trend in per capita consumption of food staples. Such coincidence between these alternative estimates suggests that relative price changes drive variations in consumption per head of agricultural goods.

Interestingly, Estimates I and II match each other closely after 1550, in particular between mid-16th and mid-18th centuries and, then, in the early 19th century, but not beforehand, in particular, during the 15th century, when Estimate II exhibits a much lower level. This raises the issue of the extent to which, at a time of high wages, people forgo food consumption in order to reduce their working time. In a high land-labour ratio economy, with an extensive use of natural resources –mainly, livestock rearing- it seems unlikely that peasants would cut down their already low number of working days per year. In the urban-led repopulation of the 14th and 15th centuries it seems also improbable that those employed in industry and services would reduce their working effort as their wages increased, particularly since trading networks linking towns within Spain and to the European markets catered for their demand. Thus, it can be inferred that Estimate I offers a more plausible representation of trends in per capita consumption of agricultural staples than Estimate II.

³¹ The sources for real wage rates, real land rents, agricultural and non-agricultural prices, and consumer price indices are detailed in Appendix I.

The close coincidence between Estimates I and III confirms the decisive role played by relative prices in determining trends in per capita consumption as they offset the differing behaviour of real wage rates and land rent. Nonetheless, higher levels can be observed for Estimate III during the late 16th and 18th centuries, as land rents partly offset the dramatic decline of real wage rates. Conversely, during the early 15th century the rise in real wage rates was mitigated by a trendless real land rent. Given the matching of Estimates I and III, and the fact that Estimate III is more comprehensive -in so far as is derived using not just wage rates but also land rent as to proxy disposable income-, we decided to use Estimate III in our computation of aggregate output. However, since Estimate III only covers 1320-1845, we assumed it evolved along Estimate I before 1320 and after 1845.

The consumption per head of food staples present two distinctive phases: up to the 1550s, of high levels; henceforth, of significantly lower ones, which largely matches the evolution of real wage rates. The highest food staples consumption per head corresponds to the pre-Black Death era. The recovery in the early 15th century fell short of the peak levels of the 1330s-1340s. The reason is that the advance of the *Reconquest* in the 13th century provided large areas of land which were not matched by demographic expansion.³² In fact, the colonization of new land was far from complete in the eve of the Black Death and migration flows southwards from northern Spain continued (MacKay 1977: 67-71). Consumption levels of agricultural staples declined from mid-15th to mid-17th century –although remained still high in the early 16th century- and, then, stabilized at a low level -despite a recovery episode in the late 17th-early 18th century followed by a sharp decline- until mid-19th century.

Due to lack of data for most of the considered period, we had to assume, as Allen (2000) did for most European countries, that agricultural trade was balanced.³³ The available evidence for the late eighteenth and early nineteenth century indicates

³² This occurred even though large numbers of Muslims did not migrate and stayed especially in the east, the Valencia region, in particular. Nonetheless, in areas along the Mediterranean coast the situation was often not too dissimilar from that in Western Europe (MacKay 1977).

³³ The first official computation of trade flows corresponds to 1792 (Prados de la Escosura 1982), and reconstructions of Spain's trade with her major partners in the eighteenth century (Romano 1957, Prados de la Escosura 1984) do not provide the trade balance for agricultural goods. Nonetheless, it is not the size of exports or imports of agricultural goods what really matters but its balance (that is, net exports) which can be easily assumed to be a small share of total consumption.

that trade represented a small share of agricultural output.³⁴ Thus, output per head (q) equals, by construction, per capita consumption (C), and total agricultural output can be, then, derived with population figures (N) as:

$$(Q)_{agr} = q N \quad [3]$$

Output outside agriculture: conjectural estimates

The dearth of data from which to infer trends in industrial and services production in preindustrial Spain is even more dramatic than for agriculture and renders the use of crude indicators necessary. Associating urbanization, for which reliable evidence is available, to the level of economic development is not new.³⁵ Historical parallels are suggested between changes in urbanization rates and per capita GDP growth.³⁶ In preindustrial economies increases in real per capita income have been linked, *ceteris paribus*, to those in the proportion of the population living in urban centres (Wrigley 1985). More cautiously, here we have accepted urban population (excluding those living on agriculture) as a proxy for non-agricultural output and, hence, assumed that trends in the rate of adjusted urbanization -that is, the share of non-agricultural urban population over total population- capture those in per capita output in industry and services.³⁷

In early modern Spain, urbanization rates have usually been considered upwardly biased as a result of the existence of ‘agro-towns’. Towns provided security and lower transactions costs in a frontier economy during the re-population process that followed the *Reconquest* and after the Black Death. After the third wave of the *Reconquest* in the 13th century, Christian settlers from Aragon, Catalonia and Southern

³⁴ It can be reckoned that Spain was a net food importer in the late eighteenth century up to, at most, 5 percent of GDP and no more than 10 percent of agricultural output (Prados de la Escosura 1993: 271-73, 276). By mid-nineteenth century, however, Spain was a net exporter of foodstuffs, though but no more than 5 percent of agricultural output (Prados de la Escosura 1988, 2003). This suggests that the improvement in consumption per head between the late 18th and the mid-19th century should be raised by around 15 percent to represent the increase in agricultural output per head. As a consequence our estimates tend to be downward biased for the early 19th century.

³⁵ Urbanization represents, according to Kuznets (1966), ‘an increasing division of labor within the country, growing specialization, and the shift of many activities from nonmarket-oriented pursuit within the family or the village to specialized market-oriented business firms’. Cf. also Acemoglu, Johnson, and Robinson (2005), Reis (2005), and Temin (2006).

³⁶ Craig and Fisher (2000: 114). This approach is supported by van Zanden (2001) who claims that “differences in levels of development ... are perhaps best approached via variations in the urbanization ratio”.

³⁷ Malanima (2011) follows a procedure similar to the one used here.

France acquired farms but preferred to live in towns (MacKay 1977: 69). Moreover, the Black Death favoured urban growth in Spain as (southern) towns were more secure and provided better services attracting immigrants from the (northern) countryside (Cuvillier 1969, Ladero Quesada 1981, MacKay 1977, Pladevall 1962, Rodríguez Molina 1978, Rubio Vela 1987, Santamaría 1969). At the same time, the formation of large landholdings was favoured by the acceleration in the pace of the *Reconquest* and the Plague (Vaca 1983, Valdeón 1966).³⁸ Thus, “agro-towns” in southern Spain seem to be the legacy of a highly concentrated landownership which resulted in a large proportion of landless agricultural workers (Casado 2001, Reher 1990).³⁹

Notwithstanding the existence of ‘agro-towns’, a large proportion of urban economic activity was associated to industry and services. In sixteenth century Old Castile, Yun-Casalilla (2004) reckons that agricultural employment represented, on average, 8 percent of the urban labour force. In late eighteenth century Spain most urban day labourers were employed outside agriculture and, according to Pérez Moreda and Reher (2003: 129), farmers (*labradores*) only represented 7.6 percent of the urban population in the 1787 population census.

Although keeping a constant threshold over time, while population grows, is rather questionable (Wrigley 1985), we have adopted the definition of ‘urban’ population as dwellers of towns of 5,000 inhabitants or more to maintain consistency with Bairoch, Batou and Chèvre (1988) estimates so international comparisons can be carried out.⁴⁰ We have used, following Álvarez-Nogal and Prados de la Escosura (2007), the urban population adjusted downwards by excluding those living on agriculture (See Appendix 1).⁴¹ Spanish ‘adjusted’ urbanization rates, at benchmark years over 1000-

³⁸ Cabrera (1989) qualifies this view and attributes the rise of latifundia to the generalization of the seigniorial regime during the 14th and 15th centuries.

³⁹ It seems clear that the higher the threshold to be deemed as an urban centre, the lower the probability of including people employed in the agricultural sector. In order to mitigate the inclusion of ‘agro-towns’, in which most of the population is employed in agriculture, Malanima (1998) proposed a lower limit for being considered urban, 5,000 inhabitants, for the north and centre of Italy, and a higher one, 10,000, for the south of the country.

⁴⁰ Such a definition is arbitrary and alternative thresholds of 10,000 (de Vries 1984) or 20,000 (Flora 1981) inhabitants have been used. Bairoch, Batou, and Chèvre (1988) employed alternatively 2,000, 5,000, 10,000, and 20,000 inhabitants as measures of urbanization.

⁴¹ Llopis Agelán and González Mariscal (2006) introduced a more astringent definition of ‘urban’ centre: in order to qualify as ‘urban’, a population centre needs to have a) more than 5,000, and b) less than half of its economically active population (EAP) occupied in agriculture. This way they estimated that, for 1787, the conventional rate of urbanization (23.7 percent, according to their own computations) should

1857, are presented in Table 2 and their rates of variation have been accepted to proxy those in non-agricultural output per head.

However, efficiency changes resulting from variations in the composition of labour by economic sectors and in the dependency rate could affect our proposed index. We have, then, carried out a sensitivity test by estimating the intersectoral shift effect that results from changes in the shares of industry and services in non-agricultural employment and in the productivity gap between industry and services. Furthermore, we allowed for changes in the potentially active to total population ratio (PAP/N) that could also affect our index. Fortunately trends in the proposed index of output outside agriculture do not appear to be significantly altered by either demographic or output composition changes during the early modern era.⁴²

Before proceeding to estimate aggregate output an apparent contradiction between a declining consumption of agricultural staples per head and a rising urbanization (adjusted) rate, which implies, under our previous assumption, an increasing consumption of industrial goods and services, needs to be confronted (Tables 1 and 2 and Figure 4). How could it be solved? A possible explanation is that the decline in the consumption of food staples per head is over-exaggerated by the use of real unskilled wage rates as a proxy for real income per head (Estimate I) since it introduces a downward bias in the estimates (at least when income inequality increases and work intensifies). However, the alternative results obtained by assuming stable real wage earnings per worker (Estimate II) and by using jointly unskilled wage rates and land rents per unit of cultivated land as a proxy for real income per head

be cut down to almost half of it (12.7 percent, or 14.5 percent if we accept a less stringent definition of urban population).

⁴² Services increased relative to manufacturing in terms of output and employment in early modern Spain (García Sanz 1991a, López-Salazar 1986, Reher 1990) probably as a consequence of the Dutch disease provoked by the inflow of American silver (Forsyth and Nicholas 1983, Drelichman 2005). Given the lack of national data, we arbitrarily assumed that the evolution of the internal composition of non-agricultural employment in Spain was captured by the shares in non-agricultural economically active population (L_{i+s}) of industry (L_i/L_{i+s}) and services (L_s/L_{i+s}) in a New Castile town, Cuenca (Reher 1990). As regards the productivity ratio between industry and services, lack of data forced us to accept a fixed ratio (1.4) derived from the Cadastre de Ensenada for the Kingdom of Castile c. 1750. The resulting intersectoral shift effect [$IS = (L_s/L_{i+s}) + (1.4 * (L_i/L_{i+s}))$] shows a mild decline over time. If alternatively the productivity gap for the 1850s were used (Prados de la Escosura 2003) the productivity index would rise slightly over 1750-1850. Changes in the potentially active to total population ratio (PAP/N) can also affect our index of output outside agriculture. Alas, we only know the evolution of the PAP/N ratio for the case of New Castile from 1586 onwards which does not exhibit major changes over time (Reher 1991).

(Estimate III) do cast similar declining trends. An alternative interpretation would be, then, that the opportunity cost of food staples consumption rose as a result of wider consumption choices and, hence, the amount of non-agricultural goods consumed increased at the expense of food staples. This scenario seems to be confirmed by the steady decline in the prices of industrial goods relative to agricultural goods, in particular, for the 16th and 18th centuries (Figure 5). Lastly, it could be argued that such a contradiction evidences the fact that rising urbanization in preindustrial societies fails to capture increases in economic activity outside agriculture as it simply results from rural immigrants expecting to live on charity.⁴³ However, even if this were the case, feeding an increasing idle urban population would imply the existence of a surplus to be distributed among the poor. Such a surplus could only result from either a redistribution of income, with the consequence of an inequality decline, or from an output increase in industry and services. Since the available evidence suggests that inequality raised both during the 16th and 18th centuries (Figures 3 and 8) the surplus resulted necessarily from the increase in non-agricultural production. Thus, the contradictory trends in per capita consumption of agricultural foodstuffs and increasing urbanization would be reconciled.

Aggregate output

To reach an estimate of aggregate output we need to combine our indicators of agricultural output and economic activity outside agriculture. Therefore, we have computed a Divisia index for real GDP per capita by weighting yearly variations in output per head in agriculture (proxied by Estimate III of agricultural goods consumption) and in industry and services (proxied by the ‘adjusted’ urbanization rate) by the average, at adjacent years, of the shares of agriculture and non-agricultural activities in current price GDP and, then, obtaining its exponential.⁴⁴ That is,

⁴³ We owe this hypothesis to Paolo Malanima.

⁴⁴ Álvarez-Nogal and Prados de la Escosura (2007) derived aggregate output (O) by combining agricultural output (qN) and the indicator of economic activity outside agriculture (namely, adjusted urbanization, $N'_{urb-nonagr,t}$), expressed in index form with 1857 as 100, with their shares in GDP in 1850–1859 –the earliest dates for which national accounts are available (Prados de la Escosura and Rosés 2009)– as weights.

$$O_t = Sa_{.1850/59} (q_t N_t) / (q_{.1857} N_{.1857}) + (1 - Sa_{.1850/59}) * (N'_{urb-nonagr,t} / N'_{urb-nonagr,.1857}) \quad [4]$$

Where $Sa_{.1850/59}$ represents the average share of agriculture in GDP in the 1850s (0.404).

$$\ln Q_t - \ln Q_{t-1} = \sum_i [\bar{\theta}_i (\ln Q_{it} - \ln Q_{it-1})] \quad [5]$$

Where share values are computed as:

$$\bar{\theta}_i = 1/2[\theta_{it} + \theta_{it-1}], \quad (i = \text{agriculture, non - agriculture}) \quad [6]$$

Current price estimates of GDP have been obtained by reflating each sector's real output with its corresponding price index and adding them up. In the case of agriculture, a price index was already available; and in the case of non-agricultural activities, rates of variation for manufacturing prices, the CPI, and nominal wage rates were arithmetically averaged and its exponential computed to obtain a non-agricultural price index.⁴⁵ This way current GDP estimates were obtained and the share of each sector derived. A crude estimate of the share of agriculture in national income at current price is presented in Figure 6. These conjectural results tend to confirm our intuition of a relatively small agricultural sector -given the significant role of towns and commerce-, in both the pre-Black Death era and the 16th century, before 17th century 'ruralisation' took place. Since the late 18th century, the agriculture share in GDP declined gradually.

But to what extent do our estimates proxy GDP or just 'market income', leaving aside home, non-marketed production? Our conjecture is that we fall short from covering non-market production and that its inclusion in our output estimates would probably have a counter-cyclical effect, moderating the intensity of both the decline and rise of output over time that we present here.⁴⁶

Trends in product per head are offered in Figure 7 and Table 3 (in which our favoured series –derived with Estimate III of agricultural output- is confronted with

However, such an approach to derive output estimates for over half a millennium introduces an index number problem, since relative prices change over time and, consequently, fixed mid-19th century weights are not representative. Furthermore, it also implies the strong and unrealistic assumption that the productivity differential between agricultural and non-agricultural sectors remained stable over time. Malanima (2011) and Pfister (2011) estimates suffer from this shortcoming.

⁴⁵ This amounts to allocating one-third of the weight to industry (the industrial price index) and two-thirds to services (nominal wage and consumer price indices), which is a good approximation to the sectoral shares within non-agricultural output in the 1850s (Prados de la Escosura 2003).

⁴⁶ For agricultural output, it is unclear that this is the case in our demand approach estimates. As for output in industry and services, a non-negligible share was contributed by the active population employed in agricultural activities and we fail to capture it, although an early use of the market even for the more remote regions of Spain has been documented (Domínguez 1994). Furthermore, the so called 'agro-towns' tended to facilitate the production for the market.

those derived using Estimates I and II). Over the long run, real output per head increased very mildly, below one-fifth, between the late 13th and mid-19th century. Three phases of sustained expansion can be distinguished, though, each one with a similar trend growth but along successively lower paths, separated by the late 14th and early 17th century crisis.

Two clearly differentiated epochs can be distinguished in the economic performance of preindustrial Spain: 1270s-1590s and 1600s-1810s.⁴⁷ In the first one, sustained progress -that can be tracked down to the 11th century- was broken by the Black Death and, then, resumed since the 1390s. By the early 14th century, Castile and, to a large extent, the whole of Spain, was a high land-labour ratio economy whose primary sector had a relatively small size, repopulation was driven by urban centres, and, helped by the relatively abundance of specie, trade networks linked towns in the Douro valley and *Camino de Santiago* with Andalusia's cities. A commercial society, initiated with the *Camino de Santiago* in the 11th and 12th centuries, developed with Castilian trade expansion and the creation of a Hansa-type network in northern Spain, the spread of Catalan economic interests in the Mediterranean, and the opening of Gibraltar straits to southern trade (MacKay 1977: 74-75, 127). All this resulted in a high income society with an expanding population, which was able to defeat Islam and extract large tributes.

The Black Death's demographic impact seems to have differed widely from its economic effects. The plague hit Spain in 1348 and most historians agree that its impact was milder than elsewhere in Western Europe. The regional impact of the Plague varied substantially (Doñate 1969, Vaca 2001). In the Kingdom of Castile, despite recurring plague outbreaks, its effects were less devastating than in the Kingdom of Aragon, Catalonia in particular (Verlinden 1938, Pérez Moreda 1988, Sobrequés 1970-71). In Teruel (Aragon), the loss of population reached 35 percent, although part of it represented plague-led emigration (Sobrequés 1970-71), while in Navarre it would have represented between 25 and 40 percent (Monteano 2001). In Castile, the loss of population was probably below 25 percent and is partly explained by migration to southern Spain since it was Andalusia the most plague-ridden region of

⁴⁷ A third epoch of modern economic growth from the early 19th century to the present is outside the focus of this paper (See Prados de la Escosura 2007).

the Kingdom of Castile (Iradriel et al. 1989). However, the economic impact of the Plague seems to have been much more dramatic than the demographic one, with real per capita income contracting by one-fourth between the 1340s and the 1370s. It is our hypothesis that, in a frontier economy -such as was the case of most of Spain- the Black Death's demographic shock destroyed commercial networks (national and international), and isolated an already scarce population with the consequence of reducing the ability to maintain per capita production levels.

A phase of long-term growth opened after the Black Death and the Spanish phase of the Hundred Years' War (1350-89) and lasted until the end of the 16th century. Economic expansion largely happened on the basis of a staple (wool) whose production adapted well to the relative abundance of land, and on a dynamic trade sector which supplied not only international markets but also domestic ones as increasing living standards stimulated the creation of an urban industry (MacKay 1977: 75). Declining relative industrial prices over 1390s-1470s (Figure 5) reinforced the allocation of resources to livestock rearing taking advantage of the closing of European markets to English wool during the Hundred Years War. Castilian transhumance expanded once Extremadura and La Mancha grass lands were won and the demand for wool grew both internationally, in the Low Countries and Italy and, then, in England (Childs 1978), and domestically, as local textile industry rose (Iradriel Murugarren 1974). American colonization and international trade expansion contributed to stimulate economic activity over 1490s-1590s. Thus, by the end of the 16th century, real output per head was close to pre-Black Death levels, while Spain had built an empire and become an economic centre which connected Europe and the New World.

The second epoch, ranging from the 1600s to the 1800s, had significantly different features and the foundations of growth of the previous epoch: wool, trade, and urban activity, would be no longer in place. A sustained fall in per capita income until mid 17th century, about one-fifth, opened it. The decline in wool exports after 1570 and the contraction in the purchasing power of American silver since the early 17th century (Flynn 1982) forced an inward-looking re-orientation of the Spanish economy. Low productivity and competitiveness in tradable production was apparently reinforced by the Dutch disease brought by American silver (Forsyth and Nicholas 1983, Drelichman 2005). The rising cost of the empire fell on Castile, its

richest and more populated kingdom. Growing taxation since 1575 led towns to increase their indebtedness which affected negatively urban activity, at the time of a decline in wool exports and the disappearance of Medina del Campo fair (Ruiz Martin 1970). As a result, population fled towns. The fiscal system collapsed as cities did (Andrés Ucendo and Lanza 2008).⁴⁸ Increasing ruralisation, however, did not imply a significant improvement in agriculture's efficiency. Economic recovery only took place in the late 18th century. Population pressure led to extensive cultivation of land. Crops (cereals, in particular) took the lead over livestock. Population, who lived mostly in interior Castile and the Guadalquivir valley in the 15th century, shifted its balance towards the periphery where a more commercial agriculture developed. When in the early 19th century Spain per capita income reached again the level of the 1590s, she was no longer an empire and a link between Europe and the New World.

These two distinctive regimes also translated into significant differences in terms of well-being. A crude inequality indicator of income distribution, the ratio of nominal output per head to nominal wage rates, expressed in index form - known as the Williamson index- has been computed. The rationale of such an indicator is that while the numerator captures returns to all factors of production per occupied person -and here we assumed that labour force evolved along total population-, the denominator represents the returns to raw labour, so the bottom of the distribution is compared to its average. It is worth recalling, however, that since wage rates might underestimate wages in the long run -as an increase in working time possibly took place in the late 18th and early 19th century-, our index could over-exaggerate inequality for this period. Some interesting results derive from Figure 8. Firstly, In the long run, inequality levels and lower economic inequality go together. Inequality increased from mid-16th to mid-17th century and, again, in the second half of the 18th century, and declined prior to the Plague and in the late 14th and 17th centuries. It could be suggested that phases of expansion (depression) tend to be accompanied by

⁴⁸ Monetary alteration (fiat currency, vellón) and debt default (1635-58), together with war with France and revolts in Catalonia (1640-53) and Portugal (1640-68) help to describe the new situation. It is worth noting that, contrary to the experience of the late 14th and 15th centuries, fiscal revenues fell and the primary sector gained weight while urban centres decline.

rising (declining) inequality, but for the early 17th century.⁴⁹ This result is largely confirmed by another inequality measure, the land rent-wage ratio (Figure 3). In the early 19th century, when population expansion was accompanied by a sustained increase in output per head, inequality stabilized according to the Williamson index, while it declined in terms of the land rent-wage ratio.

Spain's economic performance in European perspective

Half a century ago John Elliott (1961: 55-56) proposed “to compare Spanish conditions with those of other contemporary societies, and then, if it is possible to isolate any features which appear unique to Spain”. Since then, views of Spanish relative performance in Early Modern Europe have been put forward with hardly any empirical support (Kamen 1978, Cipolla 1980, Israel 1981).

The fact that a quantitative comparison is fraught with difficulties explains why no attempts have been made to establish, even at a conjectural level, Spain's relative position in preindustrial Europe. Although the number of countries for which trends in output per head can be drawn has increased lately, comparable per capita incomes at current prices and adjusted for differences in price levels –that is, expressed in purchasing power parity (PPP) terms- are lacking. We need, therefore, to resort to crude, indirect methods that necessarily produce questionable results. The most frequent one, pioneered by Angus Maddison (1995), is carrying out the comparison in 1990 international prices, that result from projecting backwards per capita GDP levels in 1990, expressed in 1990 ‘international’ dollars (PPP), with volume indices taken from historical national accounts. Although Maddison figures are widely used as they represent the most convenient procedure, his approach has been seriously objected. Perhaps, its most obvious shortcoming is the severe index number problem it introduces, that is, the fact that the basket of goods and services produced and consumed in 1990 becomes less and less representative as one moves back in time, as preferences and relative prices change as a result of modern economic growth and technological change. However, the available datasets that attempt to provide a solution by comparing current price per capita incomes, PPP adjusted, are also

⁴⁹ The different evolution of consumer price indices for lower and upper social classes constitutes an additional source of inequality in income distribution for early modern Europe (Hoffman et al. 2002).

contentious due to their limited commodity and country coverage (Ward and Devereux 2006) and to the indirect, short-cut procedure used in its construction (Prados de la Escosura 2000). Nonetheless, a reason to favour the results from a short-cut approach is that using a current price benchmark for 1850 mitigates -though far from eradicates- the formidable index introduced by the use of 1990 international dollars. Although the year 1850 is still too remote for the half a millennium considered here, modern economic growth had not gone deep yet in many European countries, as the available evidence (real wages, life expectancy, output per head growth) suggests.

In an eclectic exercise, Table 4 provides per capita GDP levels for a sample of European countries, including Spain, relative to that of the UK in 1850, which have been projected backwards to 1300 with the available national indices of real output per head. In Panel A, the benchmark estimates for 1850 are derived through a short-cut approach and expressed 1850 US relative prices (Prados de la Escosura 2000). In Panel B, the 1850 benchmark is provided by Maddison (2010) estimates in Geary-Khamis \$ 1990. This way, the reader will be able to decide which set of results seem more plausible (See Appendix 2).

Before discussing the results a word is needed about the way the national indices of real output per head are derived.⁵⁰ Estimates for Italy, Germany, and France have been constructed with a similar method to the one for the case of Spain, namely, a demand approach for agricultural output and economic activity outside agriculture proxied by urbanization. Due to lack of data, the relative income level for Italy in 1850 has been projected backward with output estimates for North and Central regions from Malanima (2011). For Germany estimates derive from Pfister (2011). As regards France, we carried out our own estimates on the basis of Allen's (2000) data on population, agricultural output, and urbanization for 1400-1800, Bairoch's (1988) for urbanization in 1850, and Toutain's (1997) for agricultural output estimates, 1790-1850, and sector shares in GDP in 1850.⁵¹ Direct output estimates for Holland and the

⁵⁰ We opted to choose the U.K. rather than Britain or England, and the Netherlands rather than Holland as scholars usually do (Allen 2000, van Zanden 2001) since we are looking at whole countries, not regions, and a major point in our paper is to establish trends in Spain, not just in Castile, and to compare Spain to other nations.

⁵¹ As in the cases of Pfister (2011) and Malanima (2011) for Germany and Germany, this is a slightly different and inferior estimate to the one for Spain, since, as it has been discussed above, the use of fixed weights over such long time span creates an index number problem. In the case of Spain, though,

Netherlands, are provided by van Zanden and van Leeuwen (2011), and for England and Britain, Broadberry et al. (2011). We assumed that Netherlands evolved as Holland over 1400-1800 and the U.K.'s moved along Britain's over 1700-1850 and, then, England's, over 1300-1700; and also that the. For Sweden we have used the estimates by Schön and Krantz (2011), as reported in Broadberry et al. (2011).

Two main results emerge from placing Spain's performance into European perspective (Table 4). On the one hand, the existence of two distinctive phases with 1600 as a turning point. In the first one, Spain appears, according to Panel A, as part of the top per income countries along with France but below Italy. By 1600 Spain would have been only behind Italy and the Netherlands. Similar, though milder results are derived from Panel B. Up to the Black Death Spain was only second to Italy and belonged to the same per capita income range of the Low Countries, France, and Britain during the 15th and 16th centuries. In the second phase, Spain fell gradually behind, and the moderate recovery since the 18th century, intensified in the early 19th century, did not suffice to stop the relative decline, so by mid-19th century Spain had joined to laggard countries of Western Europe.

On the other, contrary to most of preindustrial Europe, an association is found in Spain between population expansion and per capita output growth, as can be observed in the pre-Black Death period, and during the 16th and 18th centuries. Conversely, during phases of population decline or stagnation, namely the late 14th and early 17th centuries, real income per head did fall.

The contrast between preindustrial patterns of development in Spain and Western Europe can be highlighted by a comparison with Italy. Italy appears as Spain's mirror image (Figure 9). During phases of demographic stagnation or decline relaxing the population pressure on resources in Italy facilitates an improvement in per capita income levels, whereas, in Spain, sluggish or negative population growth go along with falling output per head and vice versa. Such a different behaviour evidences the low demographic pressure on resources that corresponds to the high land-labour ratios of a frontier economy such as Spain up to the 16th century and, then, of an economy in which cultivated land can expand at the expense of pasture.

the results derived from using a Divisia index are not substantially different from those obtained with a fixed weighted index.

Concluding Remarks: Why was Spain affluent before the American expansion?

During the 14th and 15th centuries, Spain exhibited an opposite behaviour to that of most countries in Europe and the Eastern Mediterranean, in which the recovery from the Black Death is associated to the highest output per head of the early modern era (Pamuk 2007, Clark 2010, Broadberry *et al.* 2011). Contrary to Spanish neo-Malthusian literature (Valdeón Baroque 1969), the forces underlying economic performance in Western Europe, namely, population pressure on increasingly scarce resources after more than two centuries of demographic expansion, with the consequence of diminishing returns and hunger, were not in action in Spain.⁵² On the contrary, most of Spain was a frontier economy with manpower shortage and land abundance, which implied high land-labour ratios and, most probably, increasing returns to labour (MacKay 1977). This explains why once the *Reconquest* was over and only the Nasrid kingdom of Granada remained under Islamic control, sustained progress took place. Empty lands, as the Moorish largely escaped from Christian rule, had to be populated and exploited in southern Spain. In achieving relatively high living standards prior to the Black Death, a high land/labour ratio was no doubt an important constituent. However, openness to goods and ideas from abroad also mattered as it allowed Spain to take advantage of her privileged position at the crossroads of the European and African economies. Its combination explains how Spain managed to achieve a relatively affluent position in Europe prior to her expansion in the Americas.

⁵² The Malthusian interpretation of 14th century Spain has been rejected by García Sanz and Sanz Fernández (1988) and Casado Alonso (2009).

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Appendix 1: Data sources and procedures for output estimates

All prices, wage rates, and land rents used are quoted in silver. Original regional series have been converted into grams of silver with the silver content of coins from Casado Alonso (1991), MacKay (1981), Hamilton (1934, 1936, 1947) and Felú (1991).

Unweighted Divisia indices were derived for agricultural and industrial goods and the CPI, land rent and wage rates for the Kingdoms of Castile and Aragon. Aggregate indices for Spain were obtained by assigning weights of two-thirds and one-third to the price indices of the Kingdoms of Castile and Aragon, respectively, as a crude way to capture their relative size in terms of population.

The index for agricultural prices was constructed on the basis of local indices built with original data from the following sources: for the pre-1500 era, Lérida, 1361-1500, Argilés (1998); Aragon, 1276-1429, Zulaica (1994), and 1429-1497, Hamilton (1936); Valencia, 1413-1501, Allen (2001); Toledo, 1401-1475, Izquierdo (1983); and Burgos, 1352-1501, Casado Alonso (1985, 1991, 2009) and MacKay (1981). For the period 1501-1800 price indices were constructed from the following sources: Felú (1991), for Catalonia; Hamilton (1934, 1947), for New Castile, Andalusia, and Valencia; Llopis et al. (2000) and Moreno (2002), for Old Castile. Lastly, for the years 1800-1850, Bringas (2000) index for Spain has been used.

An index of manufacturing prices for 1276-1500 was constructed on the basis of those we previously built on the basis of original data for Aragon, 1276-1429, Zulaica (1994) and 1429-1500, Hamilton (1936); Toledo, 1401-1475, Izquierdo (1983); Burgos, 1390-1500, MacKay (1981) and Casado Alonso (1985, 1991). For the period 1501-1860, we used the aggregate manufacturing price index in Rosés, O'Rourke and Williamson (2007) kindly supplied by Joan Rosés.

A CPI for 1276-1501 was constructed as weighted average of agricultural (0.75) and industrial (0.25) Divisia price indices, except for Valencia, taken from Allen (2001). For 1501-1860, a Divisia index was derived from regional CPIs: Catalonia, 1501-1807, Felú (1991), and 1830-1860, Maluquer de Motes (2005); Valencia, 1501-1785, Allen (2001); New Castile, Reher and Ballesteros (1993); Old Castile, 1518-1650, Llopis et al. (2001), and 1751-1860, Moreno (2002).

Divisia indices for nominal wage rates were computed from the following sources: Aragon, 1277-1423, Zulaica (1994), and 1423-1497, Hamilton (1936); Lérida,

1361-1500, Argilés (1998); Valencia, 1413-1500, Allen (2001); Toledo, 1401-1475, Izquierdo (1983); Burgos, 1390-1500, Casado Alonso (1985, 1991) and MacKay (1981). For 1501-1860, the sources used were: Catalonia, Felíu (2004) and Maluquer de Motes (2005); New Castile, Reher and Ballesteros (1993); Old Castile, Moreno (2002); Valencia Allen (2001).

Unweighted Divisia indices for land rents were built from data in the following sources: Aragon, 1318-1416, Zulaica (1994); Burgos, 1320-1520, Casado Alonso (1987, 2009); Andalusia, western, 1504-1845, Ponsot (1986), and Jaen, 1520-1672, Corona (1994); Old Castile, Leon, 1569-1835, Sebastián Amarilla (1990); Segovia, 1651-1690, 1780-1817, García Sanz (1986); Avila, 1790-1841, Llopis (personal communication); Zamora, 1683-1840, Álvarez Vázquez (1987); Catalonia, Gerona, 1520-1800, Duran (1985).

Urbanization rates: Spanish urban population, adjusted to exclude population living on agriculture, at benchmark years over 1530-1857, from Álvarez-Nogal and Prados de la Escosura (2007), was projected backwards to 1420, 1300, and 1000 with an estimate of urban population on the basis of the data base in Bairoch et al. (1988: 15-21), corrected for 1000 and 1300 with estimates by Glick (1979) and Bosker et al (2008), respectively. Population estimates are taken from Pérez Moreda (1988) and Álvarez-Nogal and Prados de la Escosura (2007). Annual 'adjusted' urbanization rates, namely, the ratio of adjusted urban population to total population were, then, derived by dividing the results from log-linear interpolation of urbanization and total population benchmark estimates.

Appendix 2: Alternative price levels for 1850

The comparison of countries' implicit price levels for 1850 derived from the alternative estimates (Maddison's 1990\$ and current price estimates at US relative prices Prados de la Escosura (2000)) is very revealing and lends support to the latter's estimates.

The price level [PPP/ER] -that is, the PPP exchange rate (PPP) divided by the trading exchange rate (ER)- can be easily derived as the ratio between nominal income per head (NY), that is, per capita income in domestic currency (DY) converted into a common currency with the trading exchange rate (ER), $[NY=DY/ER]$, and purchasing

power parity or 'real' per capita income (RY), namely, domestic currency income converted into a common currency with the purchasing power parity exchange rate (PPP), $[RY=DY/PPP]$.

In a Balassa-Samuelson framework one should expect that the price level would go along the level of development for similarly open economies, so the inference would be that countries of similar development should have PPP exchange rates close to their trading exchange rates, so their price levels would be similar. Meanwhile, for less development countries their PPP would be lower than the ER and, hence, their price level.

The results, obtained from data in Maddison (2010) and Prados de la Escosura (2000), indicate that, relative to the UK (=100), the price level for Spain would have been 109 according to Maddison estimates, and only of 79 with Prados de la Escosura (PPP-adjusted current price estimates. A similar comparison throws levels of 99 and 75 for Italy (in 1860), and 78 and 65 for Sweden, respectively. It is our view that the implicit price level in Maddison estimates is too high and, hence, unrealistic for Spain and Italy. Conversely, in the case of the Netherlands, Maddison implicit price level is 60 while in the current price estimate reaches 77. It seems hard to accept that the price level was so low in the Netherlands compared to Britain when these economies were open and not far apart from each other in structural terms.

Table 1
Consumption per Head of Agricultural Goods: Growth Rates (%)

	Estimate (I)	Estimate (II)	Estimate (III)
Real per capita income proxied by:	wage rates	stable wage earnings	wage rates and land rent
1280/9-1340/9	0.22	-0.03	0.19
1340/9-1370/9	-1.33	-0.71	-1.29
1370/9-1590/9	-0.07	-0.06	-0.04
1590/9-1660/9	-0.28	-0.22	-0.35
1660/9-1810/9	-0.05	0.00	-0.04
1810/9-1850/9	0.42	0.18	0.33
1280/9-1850/9	-0.09	-0.08	-0.09

Sources: See the text and Appendix 1, Table A1-1.

Table 2
Adjusted Rate of Urbanization* (%)

1000	8.0
1300	8.8
1400	7.8
1530	9.9
1591	14.5
1700	11.1
1750	13.5
1787	17.4
1857	23.2

* Share of population in towns of 5,000 and over, excluding those living on agriculture

Sources: post-1530, Álvarez-Nogal and Prados de la Escosura (2007); pre-1530, see the text and Appendix 1.

Table 3
Real Output per Head Growth (%)

	Ag: Estimate I	Ag: Estimate II	Ag: Estimate III
1280/9-1340/9	0.12	-0.02	0.11
1340/9-1370/9	-0.79	-0.48	-0.77
1370/9-1590/9	0.08	0.09	0.09
1590/9-1660/9	-0.27	-0.23	-0.31
1660/9-1810/9	0.13	0.16	0.13
1810/9-1850/9	0.44	0.31	0.39
1280/9-1850/9	0.03	0.04	0.03

Sources: See the text and Appendix 1, Table A1-2.

Table 4
Output per Head in Western Europe (U.K. in 1850 = 100)

Panel A. Relative Per Capita GDP in 1850 at current US relative prices (PPP) (UK=100)

	UK	Netherlands	Germany	France	Italy	Spain	Sweden
1300	25				72	51	
1348	26	22			67	54	
1400	38	31		52	78	48	
1500	39	37	49	50	68	50	
1570	39	37			64	54	35
1600	37	68	34	50	60	53	
1650	34	69			62	41	
1700	55	54	40	54	65	48	
1750	61	60	45	55	68	46	
1800	75	67	42	56	60	54	41
1850	100	79	61	78	66	64	52

Panel B. Relative Per Capita GDP in 1850 at 1990 international prices (PPP) (UK=100)

	UK	Netherlands	Germany	France	Italy	Spain	Sweden
1300	25				66	37	
1348	26	29			62	39	
1400	38	39		46	72	35	
1500	39	48	49	44	63	36	
1570	39	47			60	39	29
1600	37	88	35	44	56	38	
1650	34	89			57	29	
1700	55	69	40	47	60	35	
1750	61	78	45	48	63	34	
1800	75	86	42	49	56	39	34
1850	100	102	61	69	61	46	44

Sources: Relative per capita GDP levels to the U.K. in 1850, at current US relative prices (Panel A) from Prados de la Escosura (2000), and at 1990 Geary-Khamis international dollars (Panel B), from Maddison (2010). In Panel A Italy's relative level in 1850 was assumed to be that of 1860. In Panel B, Italy's level in 1850 was obtained by projecting Maddison (2010) estimates for 1913 with Malanima (2011) real output per head series. 1850 levels were projected backwards with national real output series. For Spain, see the text; for Italy, Malanima (2011), assuming that Italy as a whole evolved as the North and Central regions; for Germany, Pfister (2011). For Holland and the Netherlands, van Zanden and van Leeuwen (2011), and for England and Britain, and Sweden, Broadberry et al. (2011). We assumed that Netherlands evolved as Holland over 1400-1800 and the U.K.'s moved along Britain's over 1700-1850 and, then, England's, over 1300-1700. For France we carried out our own estimate on the basis of Allen (2000) data on population, agricultural output, and urbanization for 1400-1800, Bairoch (1988), for urbanization in 1850, and Toutain (1997) for agricultural output estimates, 1790-1850 and sector shares in GDP in 1850.

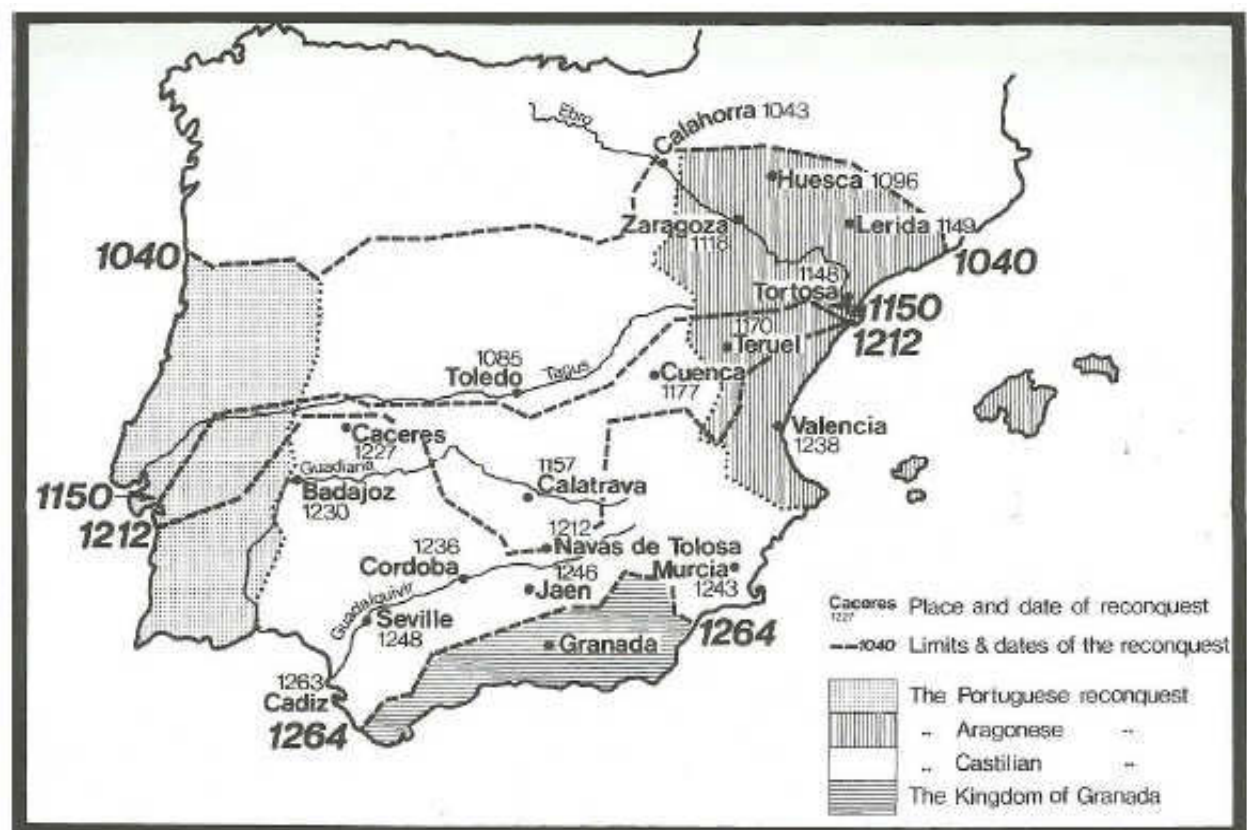


Figure 1 The Reconquest: Main Phases

Sources: MacKay (1977)

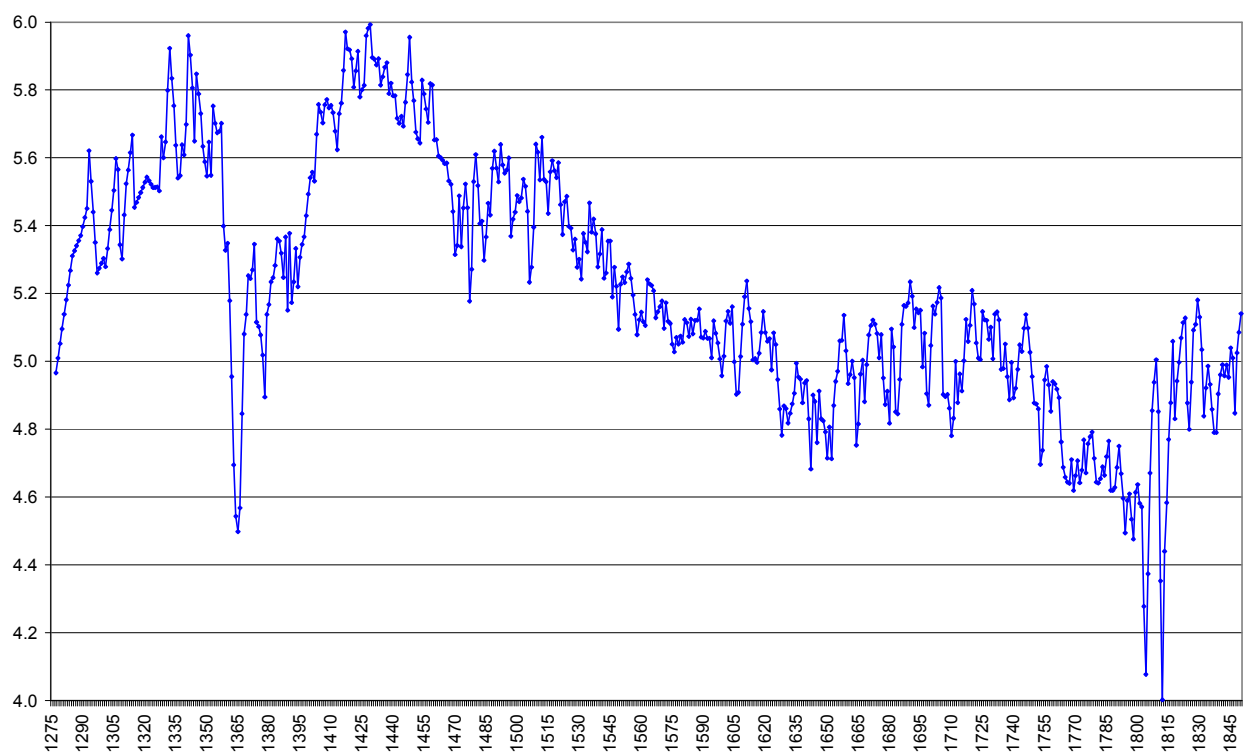


Figure 2 Real Wage Rates, 1277-1850 (1790/99 = 100) (logs)

Sources: See Appendix

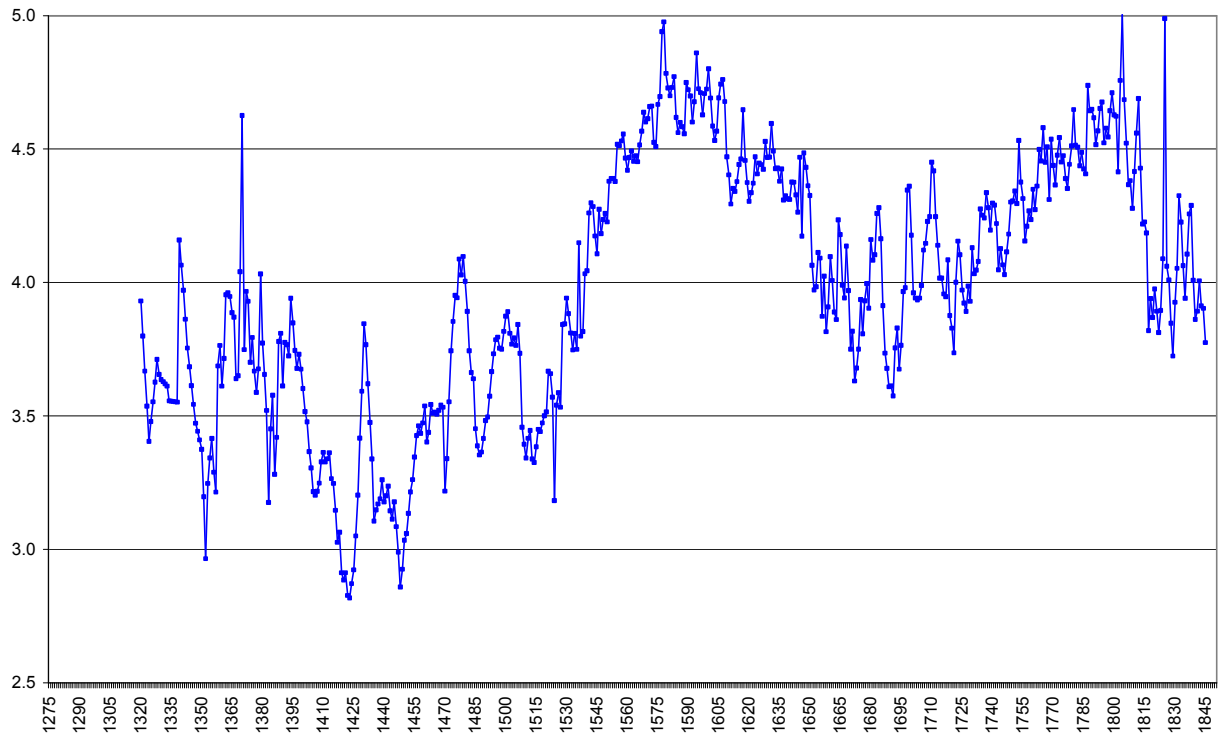
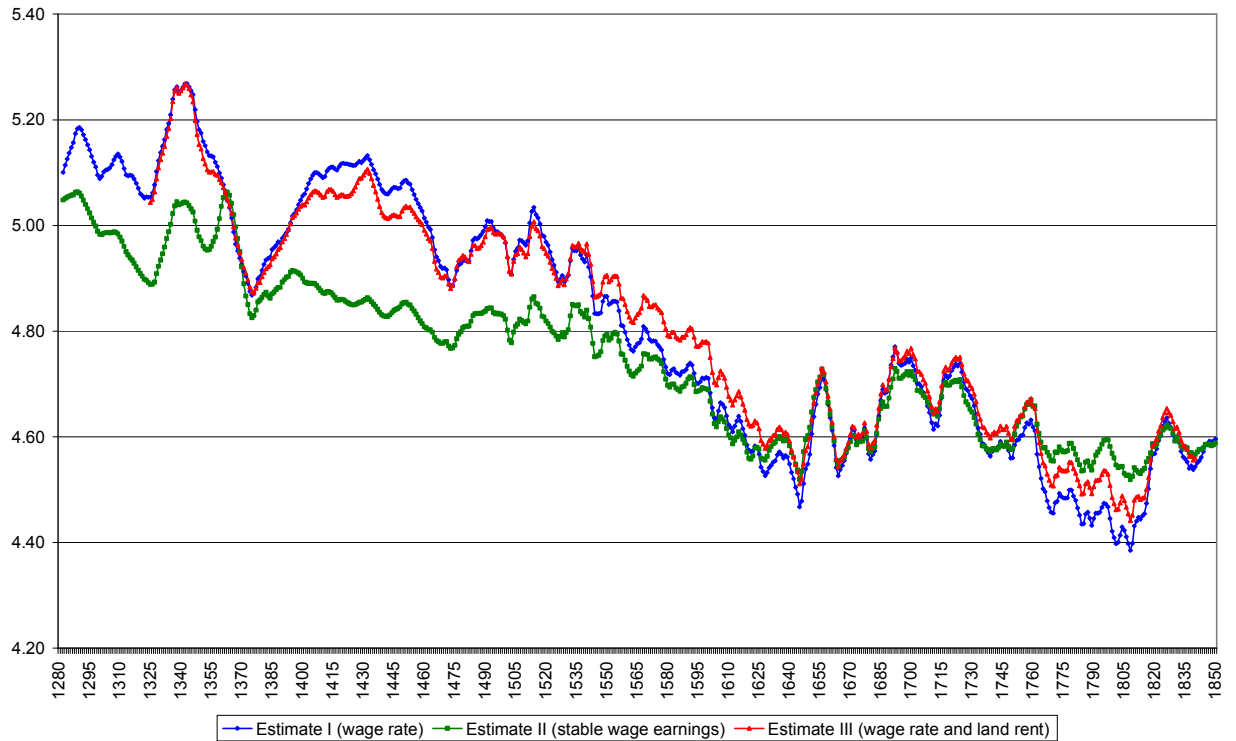


Figure 3 Land Rent- Wage Rate Ratio, 1320-1845 (1790/99 = 100) (logs)

Sources: See Appendix



**Figure 4 Real Consumption per Head of Agricultural Goods, 1277-1850:
Alternative Estimates [11-year moving averages] (1850/59 = 100) (logs)**

Sources: See the text.

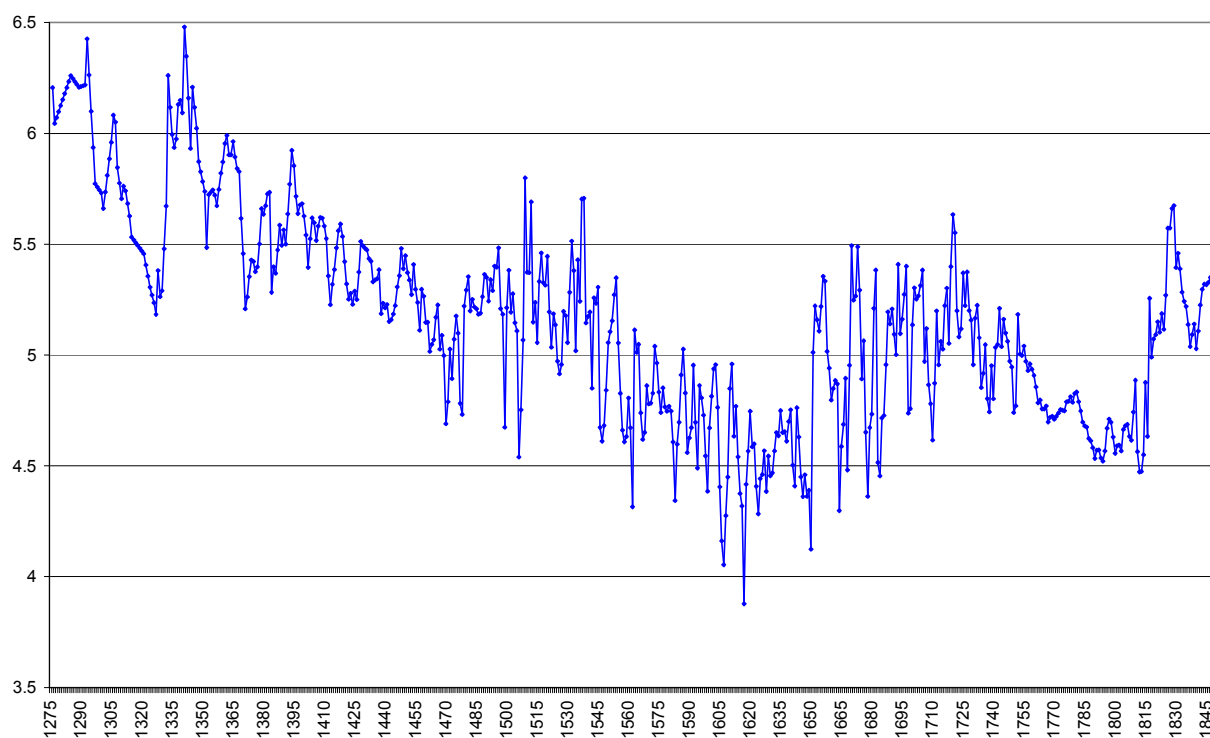


Figure 5 Ratio Industrial to Agricultural Prices, 1277-1850 (logs)

Sources: See the text

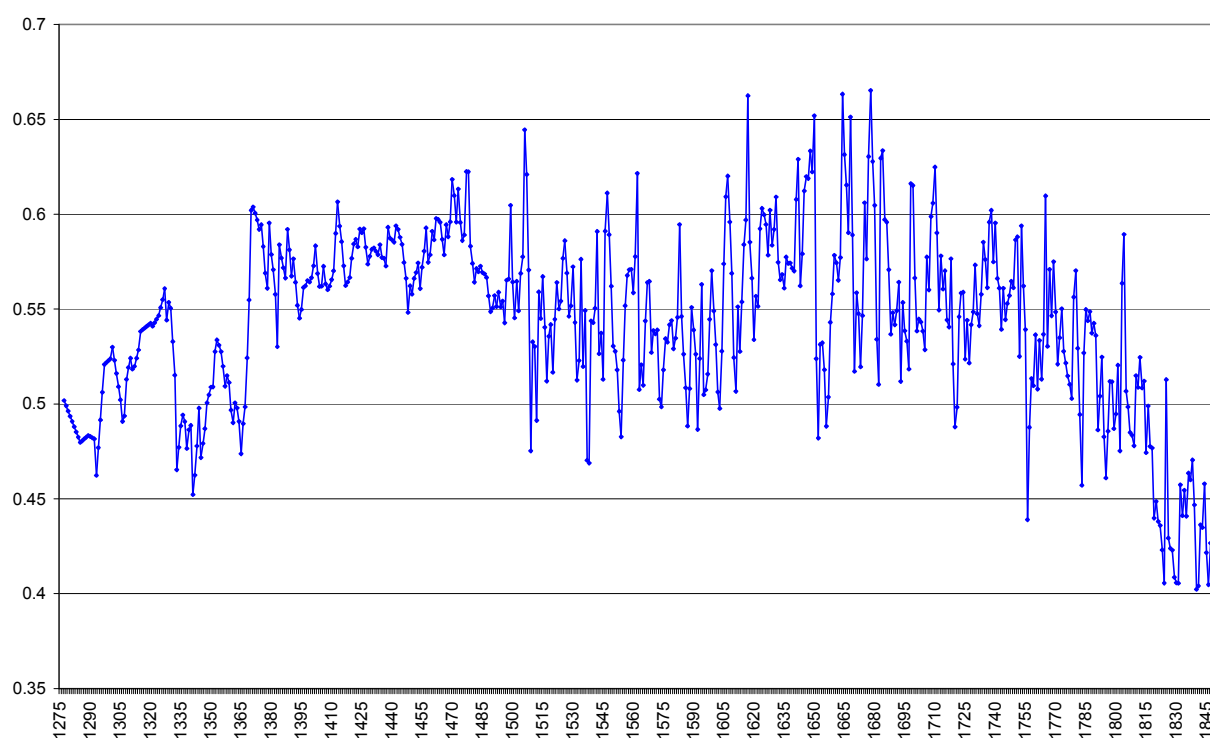
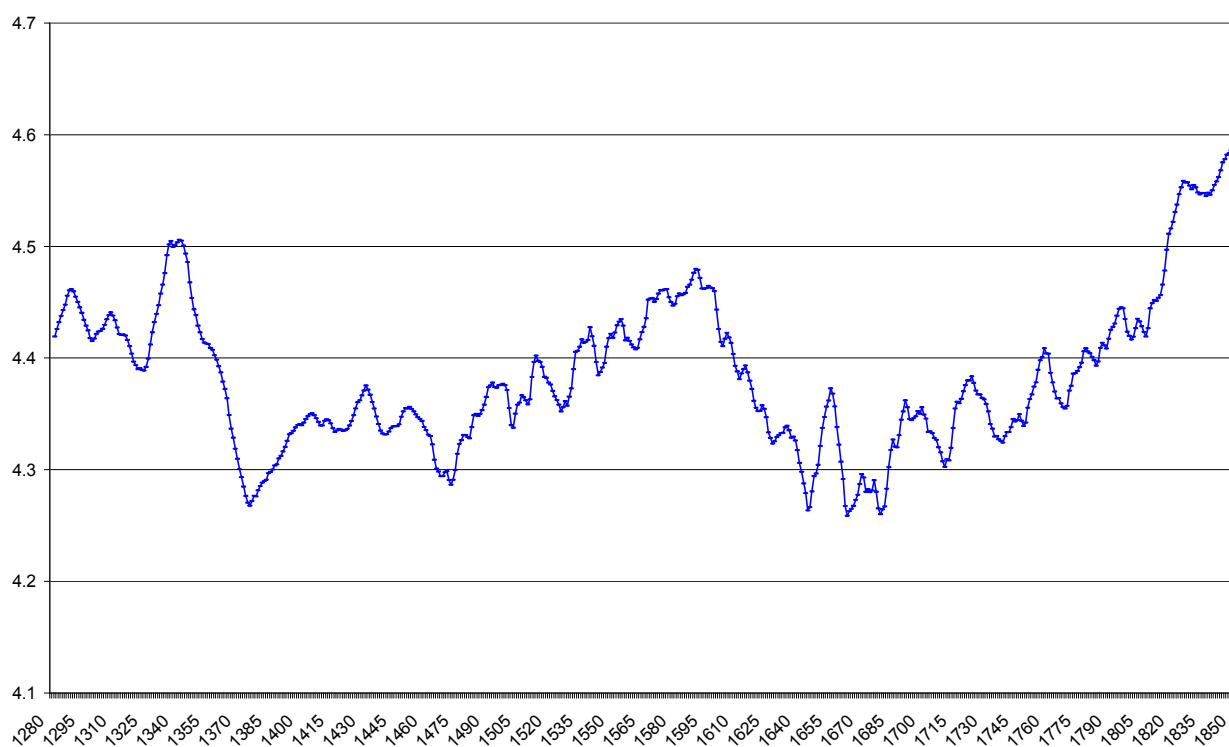


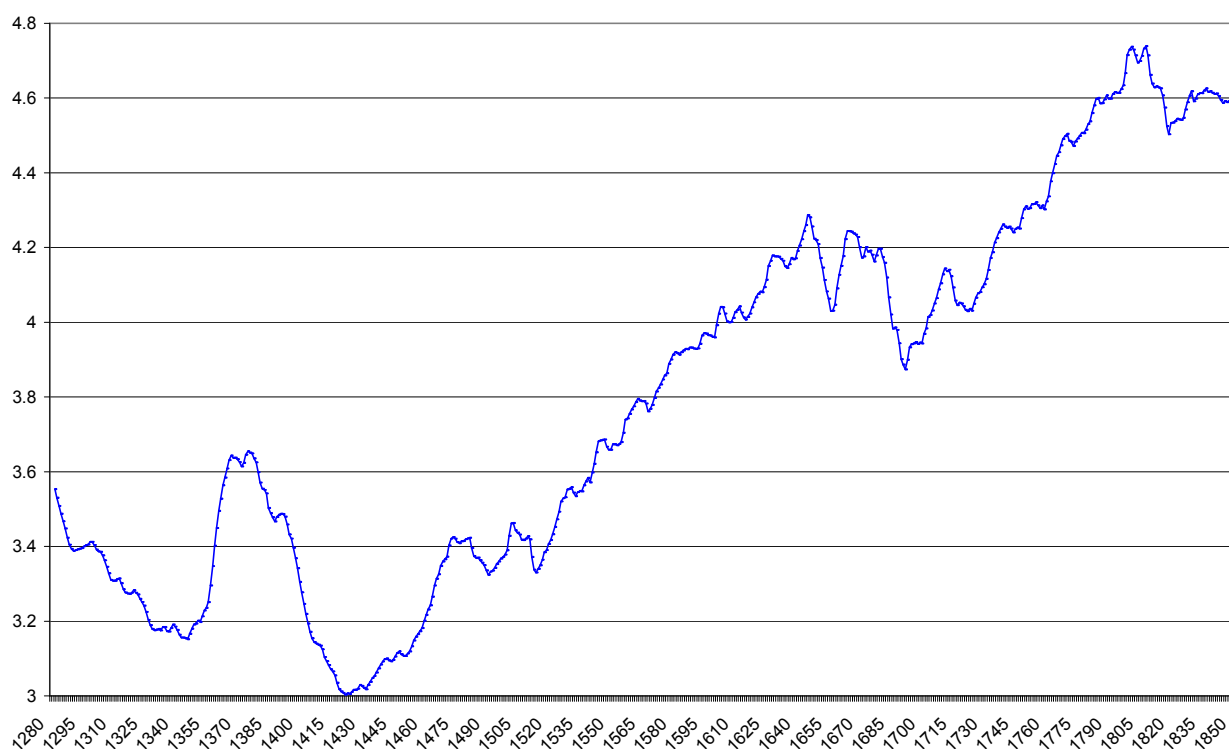
Figure 6 Share of Agriculture in GDP, 1277-1850 (current prices) (%)

Sources: See Appendix



**Figure 7 Real Output per Head 1280-1850 [11-year moving averages](1850/59 = 100)
(logs)**

Sources: See the text



**Figure 8 Inequality (Williamson Index), 1277-1850 [11-year moving averages]
(1850/59 = 100) (logs)**

Sources: See the text

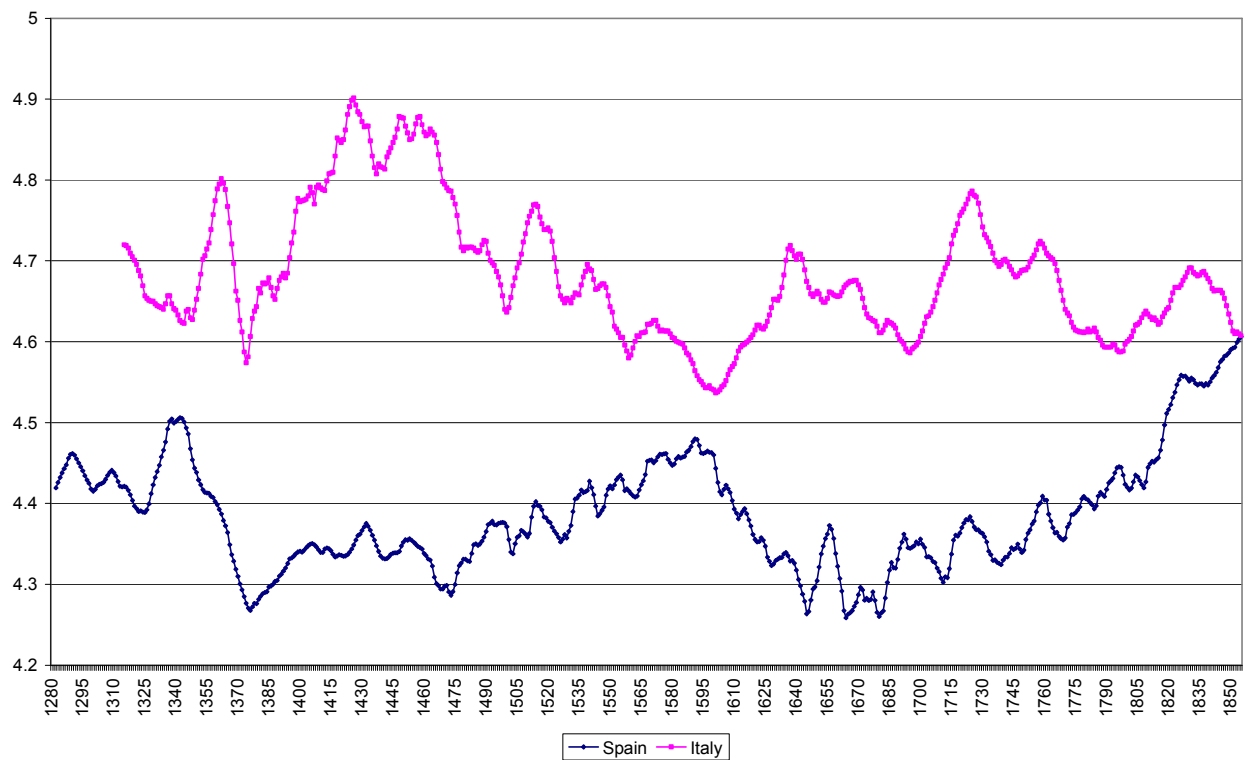


Figure 9 Real Output per Head in Spain and Italy 1280-1850 (1850/59 = 100)
(11-year moving averages) (logs)

Sources: See the text

Appendix 1 Table A1-1

Consumption per Head of Agricultural Goods: Alternative Estimates (decadal averages) (1850/59 = 100)

	Estimate I	Estimate II	Estimate III
per capita income proxied by	wage rate	stable wage earnings	wage rate and land rent
1280/9	170	157	172
1290/9	173	153	175
1300/9	166	147	168
1310/9	164	140	165
1320/9	156	133	155
1330/9	182	148	181
1340/9	194	154	192
1350/9	169	141	164
1360/9	152	158	153
1370/9	130	124	131
1380/9	141	130	139
1390/9	150	136	150
1400/9	163	133	158
1410/9	165	130	158
1420/9	166	127	157
1430/9	166	128	161
1440/9	159	126	151
1450/9	158	127	153
1460/9	144	121	141
1470/9	132	118	132
1480/9	144	125	142
1490/9	147	126	146
1500/9	140	122	139
1510/9	151	128	147
1520/9	137	121	135
1530/9	142	128	143
1540/9	125	115	129
1550/9	130	122	136
1560/9	118	113	125
1570/9	119	116	127
1580/9	113	109	120
1590/9	111	109	119
1600/9	103	102	110
1610/9	103	100	108
1620/9	97	97	102
1630/9	96	99	101
1640/9	88	93	92
1650/9	110	113	112
1660/9	91	93	93

1670/9	100	99	100
1680/9	105	104	107
1690/9	114	111	115
1700/9	112	110	114
1710/9	105	106	107
1720/9	114	110	115
1730/9	99	98	102
1740/9	99	98	102
1750/9	100	104	104
1760/9	91	98	95
1770/9	90	98	94
1780/9	85	94	90
1790/9	88	99	93
1800/9	83	93	88
1810/9	85	93	87
1820/9	102	101	103
1830/9	95	97	97
1840/9	97	98	98
1850/9	100	100	100

Appendix 1 Table A1-2

Real Output per Head: Alternative Estimates (decadal averages) (1850/59 = 100)

Ag: Estimate III	
1280/9	84
1290/9	85
1300/9	84
1310/9	83
1320/9	80
1330/9	88
1340/9	90
1350/9	82
1360/9	79
1370/9	72
1380/9	73
1390/9	76
1400/9	77
1410/9	77
1420/9	77
1430/9	79
1440/9	76
1450/9	78
1460/9	75
1470/9	73
1480/9	77
1490/9	79
1500/9	78
1510/9	81
1520/9	78
1530/9	82
1540/9	80
1550/9	85
1560/9	83
1570/9	87
1580/9	86
1590/9	87
1600/9	82
1610/9	81
1620/9	78
1630/9	77
1640/9	72
1650/9	79
1660/9	70
1670/9	72
1680/9	75

1690/9	77
1700/9	77
1710/9	76
1720/9	80
1730/9	76
1740/9	77
1750/9	80
1760/9	79
1770/9	81
1780/9	81
1790/9	85
1800/9	84
1810/9	86
1820/9	95
1830/9	94
1840/9	97
1850/9	100